CENWP-OD-G August 31, 2009

Memorandum for: Portland District Regulatory Branch, Ms. Debra Henry

Subject: Project Review Group (PRG) Technical Memorandum for the Sampling and Analysis Plan (SAP) for NWP-2007-195, Vigor Industrial berth deepening.

Reviewers: James McMillan (CENWP-OD-G), Dan Gambetta (NMFS), Laura Inouye (WA Ecology), Peter Anderson (OR DEQ), Jeremy Buck (USFWS)

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Project Authorities: Section 10 of the Rivers and Harbors Act, Section 7 of the Endangered Species Act, Section 305 of the Magnuson-Stevens Act, et al.

Project Description: The Portland Ship Repair Yard is located at 5555 North Channel Avenue in Portland, Oregon (Latitude 45 32' 30", Longitude 122 42' 30"), between the Swan Island Lagoon and the Willamette River on a peninsula known as Swan Island

Vigor Industrial is proposing to perform maintenance dredging at the Portland Ship Repair Yard, located in Portland, Oregon. The project involves the removal of an approximate total of 81,000 cubic yards (cy) of material from two areas at the facility. Approximately 2,500 cy of sediment will be removed from the Dry Dock 1 Area basin, and approximately 78,500 cy from the Dry Dock 3 Area basin. The Dry Dock 1 Area to be dredged covers approximately 0.22 acres and the Dry Dock 3 Area covers approximately 6.2 acres

Dry Dock 1: The design dredge depth is -55 feet CRD with a -1 foot over dredge allowance. A bench will be cut at -55 feet CRD around the dry dock footprint, between 20 and 50 feet from the end wall of Pier C Approximately 10 feet of sediment will be removed across the total dredge area. For structural purposes, the sidewalls of the bench will be sloped at 2H:1V. This slope is consistent with the currently existing sediment slope angles at the facility.

Dry Dock 3: The proposed dredge areas lays to the north side of Pier D. The design dredge depth is -65 feet Columbia River Datum, with -1 over dredge allowance. The dredge area will extend approximately 990 feet from the Dry Dock 3 basin end wall to the end of Pier D. Approximately 8 to 10 feet of sediment will be removed across the total dredge area. For structural purposes, the side walls will be sloped at 2H:1V from mudline down to -65 feet CRD. This slope is consistent with the currently existing sediment slope angles at the facility.

Dredging Method: Dredging will be performed using a cable arm dredge with a 21 cy bucket. When correctly operated, cable arm dredges are extremely efficient, leaving behind only a small percentage (6%) of the target material. See Figure 1, below.

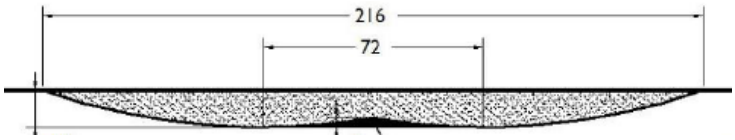

Figure 1. Cable arm dredge cut (cross-sectional view);

Dredged Material Disposal: Dredge material will be placed in a contained flat deck barge. Water from sediment dewatering will be captured and transferred to a wastewater treatment facility located at the site. The dewatered dredge material will be transported by barge and then trucked to the Wasco County municipal landfill in The Dalles, Oregon.

Management Area Ranking/ Recency: High/ Re-sampling will be required after 2 years have passed from the sampling date. Exceptions to this recency requirement may be considered for the new surface material, since it is not anticipated that the composition of this material will change.

Sampling and Analysis Description: Vigor Industrial is proposing to dredge approximately 81,000 cy of material from two areas at the facility. According to Vigor, the sediment is considered homogeneous and has been divided into a total of nine dredge material management units (DMMUs).

Vigor's Proposed Sampling Scheme:
Dry Dock 1: The proposed the Dry Dock 1 Area consists of Section 1 and is comprised of a single DMMU, identified as DMMU 1 (Figure 2).
A total of 3 cores would be taken from Dry Dock 1. In Section 1, sample cores will be collected from three locations (1-1, 1-2, and 1-3) in 5-foot increments, to a maximum depth of 20 feet. The material from 0 to 15 feet below mudline (i.e. the maximum dredge depth) in each core will be composited into a single sample and submitted for chemical and physical analysis. The three samples of the new surface material (NSM) from 15 to 20 feet below mudline will be archived discretely for future analysis, pending the results of the composite sample analysis.

Dry Dock 3: The sediment to be removed from the Dry Dock 3 Area has been divided into eight DMMUs. The proposed dredge prism has been divided into four horizontal sections (labeled as 2, 3, 4, and 5) from west (end of Pier D) to east (end wall), and vertically into two layers (A and B) (Figure 3). The DMMUs consist of:

- Two, approximately 5-foot thick layers for Section 2 (DMMUs 2A and 2B);
- Two, approximately 5-foot thick layers for Section 3 (DMMUs 3A and 3B);
- One, approximately 4-foot thick layer (DMMU 4A) and one, approximately 5-foot thick layer (DMMU 4B) for Section 4; and
- One, approximately 3-foot thick layer (DMMU 5A) and one, approximately 5-foot thick layer (DMMU 5B) for Section 5.

A total of 20 cores would be taken from Dry Dock 3. Individual samples from each DMMU will be composited and submitted for laboratory analysis. Samples will be collected in approximately 5-foot depth increments (note that 4 and 3-foot sample increments will be used in DMMUs 4A and 5A respectively) to depths ranging from 0 to approximately 15 feet below mudline surface in

each coring location (i.e., one sample from each of the two DMMU layers and one of the newly exposed surface material in each location). The specific coring locations within the footprint of Dry Dock 3 are based on the 5-foot wide spacing between the six flotation tanks (98-foot centers). Samples from the equivalent depths within the same DMMU will be composited and submitted for chemical and physical analysis. The 25 samples (one from each coring location) of NSM will be archived discretely, pending the results of the composite sample analysis. Sampling locations for Dry Dock 3 appear in Figure 3 (Vigor's Figure 10) (attached)

PRG Optional Sampling Scheme:
Dry Dock 1: No alternatives proposed.

Dry Dock 3: The primary objective of sampling is to compare the existing surface with the NSM to determine if the aquatic environment would be degraded as a result of the project. A secondary objective is to characterize the dredge prism for DEQ's Solid Waste Letter of Authorization SWLA. Since upland disposal is proposed for the dredged material, and since dredge prism characterization is a secondary objective, analyses should primarily focus on NSM and existing surface characterization to determine if the proposed project would result in degradation of the aquatic.

The PRG has also examined what the true NSM composition would likely be after dredging. Based on information from the Corps Engineering Research and Development Center (ERDC), the NSM includes that material at the dredged depth, plus a portion of the dredge prism in the peaks left behind by the bucket, plus fallback from the bucket on the last pass (ERDC 2008; ERDC 2007).

The NSM interval that is characterized should extend 1 foot into the dredge prism, since portions of that material would be left as peaks after dredging with a bucket. The remainder of the NSM interval should extend from the proposed bottom depth (-65' CRD) to 2 feet below, for a total interval of 3 feet. This 3-foot interval is approximately 30,000 cy (10,000 cy dredge prism @ -64 to -65 feet + 20,000 cy NSM @ -65 to -67 feet).

The upper 6 inches of each core should be analyzed to characterize the existing surface layer. This 6-inch interval is approximately 5,000 cy.

The remainder of the dredge prism (above -64 feet) is approximately 65,000 cy. A mixture of this material is projected to fallback from the bucket onto the NSM during the last pass of the bucket. Fallback rates of the dredged prism material are based on a technical report prepared by the Corps' Engineering Research and Development Center (ERDC). In dredged material without a hardpan or bedrock, and with little debris, ERDC reported fallback rates ranging from 2% to ~6% of the dredge prism depth (ERDC, 2008). We conservatively estimate a fallback rate of approximately of 5%, and project that the fallback volume for Dry Dock 3 to be ~3,000 cy.

Refer to Figure 4 attached at the end of this memo. The PRG proposes the following alternative sampling scheme to meet the sampling objectives:

Commented [D1]: They need to analyze at least 12 of these samples discretely.

Commented [lsi2]: Disagree with Dan, this sections is needed, but note the depths do not match earlier section, which says design depth is -65 with 1 ft overdredge.

Commented [D3]: Im not sure if this is necessary information.

Commented [D4]: Wait what? Don't you mean the bottom 6 inches of each core?

Commented [lsi5R4]: Top 6 inches is right, this is for existing surface.

- Total volume characterized at high-rank requirements: ~38,000 cy
- 8 DMMUs (3 levels); 5 cores in DMMU 2, and 3 cores each in DMMUs 3 and 4 (11 cores)
- Discrete analyses for the NSM samples (11 discrete analyses)
- Composite analyses for the existing surface layer (3 discrete analyses)
- Composite material from DMMU 2A into one sample; composite material from DMMU 3-4A into one sample; 2 composite sample analyses total
- Total analyses: 16

Commented [lsi6]: Existing surface layer is being characterized in DMMU 2-4, with top 6 inches of material composited for each DMMU, right? If so, need to add a bullet. This leaves the bottom of the 11 cores for NSM analysis (discrete) (can't get an even 12 out this plan, hope there is not a reason Dan wants 12).

Commented [D7]: Since there are only 4 DMMUs overlying the NSM, 12 discrete analyses are probably necessary.

Commented [D8]: What about compositing each dredge prism DMMU for a total of 8 dredge prism samples?

Recommendations:

1. Vigor Industrial's SAP for their dry dock maintenance dredging does not meet the SEF guidance as proposed. At least 12 of the NSM samples need to be discretely characterized to gauge if the project will improve or degrade the aquatic environment (as compared with the existing surface). Additionally, the NSM thickness should bracket the target dredge depth (-65' CRD), and should be 3 feet thick.
2. Vigor's sampling needs to adequately characterize the existing surface. Composite samples (4 total composite samples) need to be measured in the upper 6 to 12 inches of the dredge prism.
3. Vigor may composite the remainder of the dredge prism material samples (i.e., that material not measured by the NSM samples or the existing surface samples) into two composites: a super composite of DMMUs 2 and 3, and a super composite of DMMUs 4 and 5.
4. The PRG recommends that the NSM interval be archived, should additional analyses be necessary. The PRG also recommends that Vigor collect enough material to conduct bioaccumulation studies, should they be necessary.
5. Vigor has the option to utilize the PRG's sampling scheme, which would reduce the total number of cores and DMMUs over the project.

Additionally, the PRG recommends that all 11 NSM intervals are archived (discretely) in the event that biological testing is warranted.

References:

ERDC. 2007. Overdredge Depth Dredging and Characterization Depth Methods. ERDC/TN EEDP-04-37, prepared by the Dredging Operations Technical Support (DOTS) Program. June 2007. 32 pp.

ERDC. 2008. The Four Rs of Environmental Dredging: Resuspension, Release, Residual, and Risk. ERDC Technical Report TR 08-04. February 2008. 53 pp + appendix.

ERM. 2009. Revised Maintenance Dredging Sampling and Analysis Plan, Portland Ship Repair Yard, Portland, Oregon. Prepared for Vigor Industrial, Inc., May 2009. 20pp + figures.

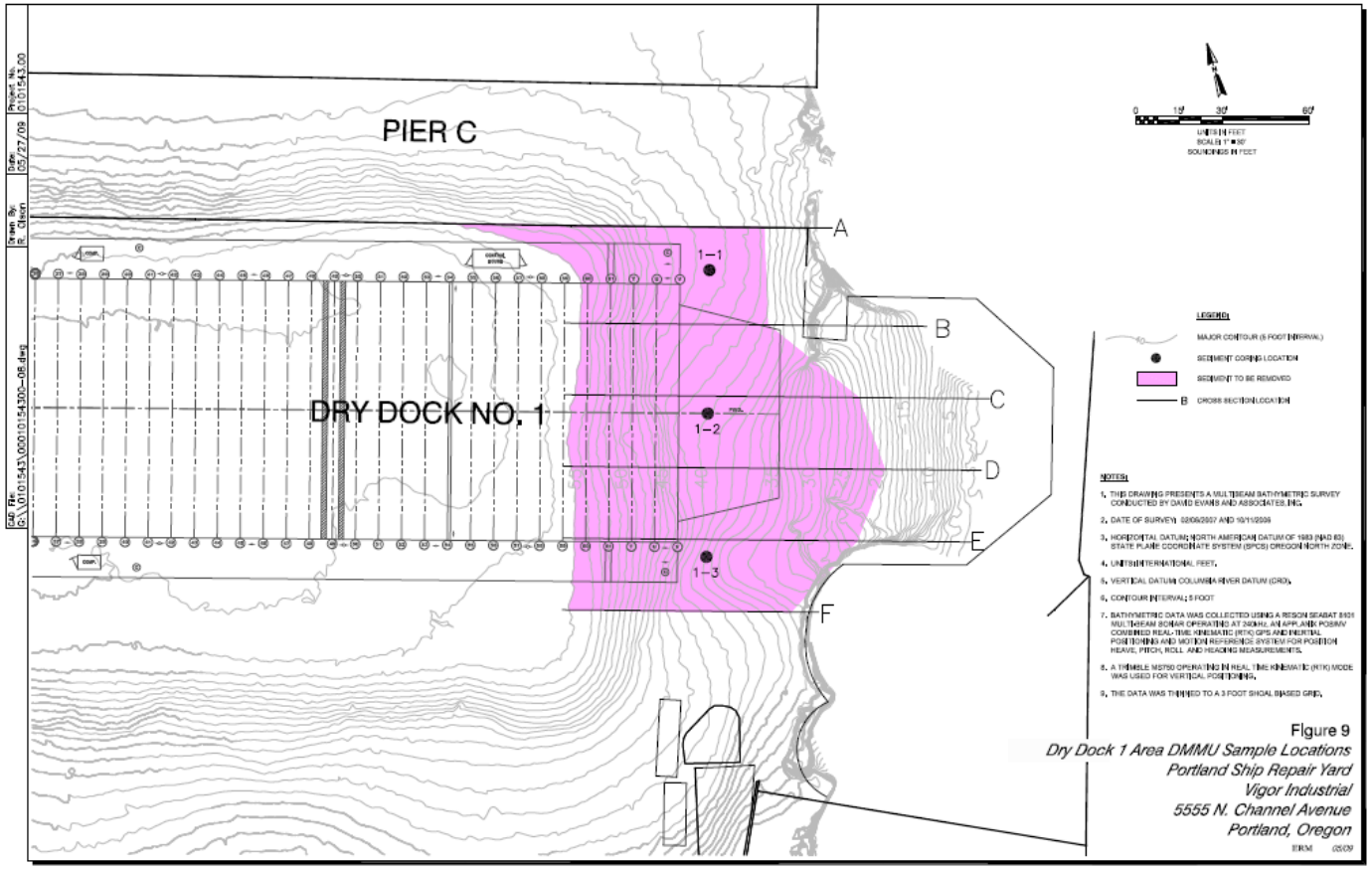

Figure 2. Dry Dock 1.

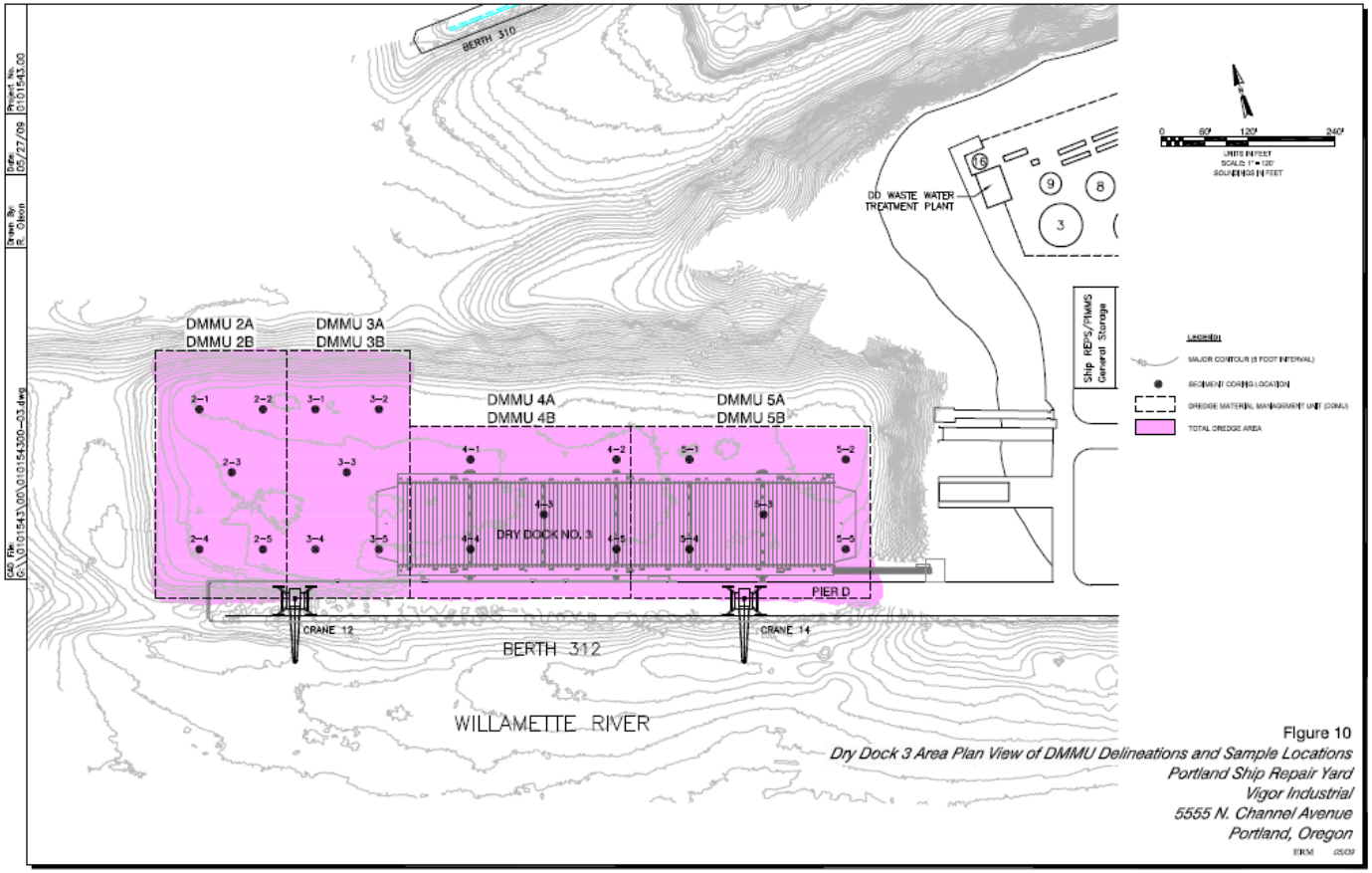

Figure 3. Dry Dock 3.

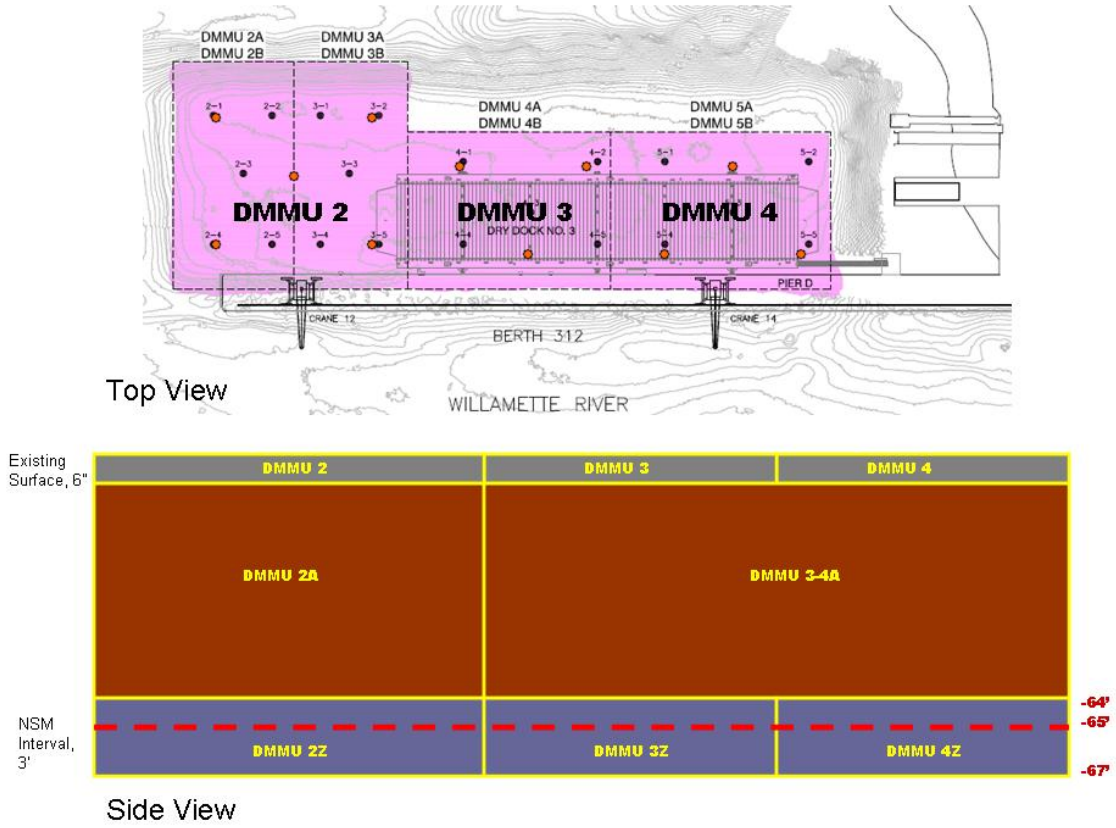

Figure 4. PRG Optional Sampling configuration. The orange points are the proposed alternative vibracore sampling locations.